

FIG. 1

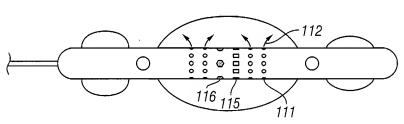


FIG. 2

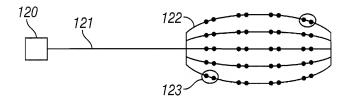


FIG. 3

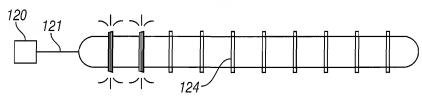
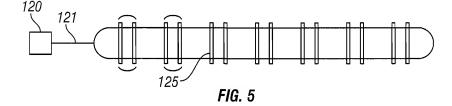


FIG. 4



201

The catheter 100 is ready for use to treat dilatation 113 or other diseased or abnormal tissue.

202

The catheter 100 is inserted into the lumen 104 of a patient. In alternative embodiments the catheter 100 may be inserted into the patient at a body structure which is made available during surgery or by virtue of a wound.

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The catheter 100 is maneuvered by an operator (not shown) to a position in the lumen 104 approximately adjacent to the dilatation 113 while the operator views the position of the catheter 100 using fluoroscopy, ultrasound, or other suitable means.

204

The occluding balloons 106 and 107 are inflated and the dilatation 113 sealed off from the remainder of the lumen 104.

<u> 205</u>

The treatment balloon 108 is inflated with treatment fluid 112 exuded from ports 111. Simultaneously any body fluids in the occluded dilatation 113 are removed by suctioning them into suction ports 114. Inflation of the treatment balloon 108 and suction of body fluids continues until all body fluids have been removed from the occluded dilatation 113 and the outer surface of the treatment balloon 108 has been brought into contact with the inner surface of the lumen wall 105 of the dilatation 113.

<u> 206</u>

RF energy is emitted by electrodes in the catheter tip assembly 101 at a selected frequency and power level effective to heat the treatment fluid 112 to a temperature at which it is readily absorbable into the tissue of the lumen walls 105. In alternative embodiments, other types of energy may be emitted.

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The heated treatment fluid 112 in the treatment balloon 108 is pressurized to a selected pressure, effective to cause the treatment fluid 112 to exude through the microporous membrane of the treatment balloon and come into contact with the lumen walls 105.

<u> 208</u>

The heated treatment fluid 112 is suffused into and absorbed by the tissues of the lumen walls 105.

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Additional RF energy is emitted by the electrodes in the catheter tip assembly 101 at a selected frequency and power level effective to preferentially heat tissues of the lumen walls 105 which have absorbed the treatment fluid 112. Heating of lumen wall tissues 105 continues until they have been softened. Optionally, while tissues of the lumen walls 105 are being heated, cool treatment fluid 112 may be circulated in the occluded portion of the lumen 104 by exuding it from ports 111 and suctioning it into suction ports 114, in order to minimize thermal damage to the lumen walls 105.

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The heated treatment fluid 112 is removed from the occluded portion of the dilatation 113 via the suction ports 114. The occluded portion of the dilatation is filled with chilled treatment fluid 112 via the ports 111.

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The dilatation 113 is contracted by application of the chilled treatment fluid 112 and by application of a vacuum via the suction ports 114 so that dilatation 113 shrinks to a diameter within a normal diameter range for the lumen 104.

to FIG. 6B

213

Additional RF energy may be emitted by the electrodes in the catheter tip assembly 101 at a selected frequency and power level effective to ablate tissues of the lumen walls 105, while chilled treatment fluid 112 is circulated by exuding it in via the ports 111 and suctioning it out via the suction ports 114 in order to minimize heating and damage of cells lining the inner surface of the lumen walls 105 and remove detritus of ablation.

214

The tissues of the lumen walls 105 are hardened in the contracted condition by further application of RF energy and circulation of chilled treatment fluid 112.

215

The occluding balloons 106 and 107 and the treatment balloon 108 are deflated.

216

The catheter 100 is removed from the body of the patient.

220

The dilatation has been treated and should be in a condition for normal operation.